

PAT-112CN 4/01

JUN 18 Rec'd PCT/PTO 07 JUN 2001

11. ☒ Please see the attached Preliminary Amendment
12. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)), i.e., before 18th month from first priority date above in item 3, are transmitted herewith (file only if in English) including:
13. ☒ PCT Article 19 claim amendments (if any) have been transmitted by the International Bureau
14. ☐ Translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)), i.e., of claim amendments made before 18th month, is attached (required by 20th month from the date in item 3 if box 4(a) above is X'd, or 30th month if box 4(b) is X'd, or else amendments will be considered canceled).
15. **A declaration of the inventor** (35 U.S.C. 371(c)(4))
- a. ☐ is submitted herewith ☐ Original ☐ Facsimile/Copy
- b. ☒ is not herewith, but will be filed when required by the forthcoming PTO Missing Requirements Notice per Rule 494(c) if box 4(a) is X'd or Rule 495(c) if box 4(b) is X'd.
16. **An International Search Report (ISR):**
- a. Was prepared by ☒ European Patent Office ☐ Japanese Patent Office ☐ Other
- b. ☒ has been transmitted by the international Bureau to PTO.
- c. ☒ copy herewith (2 pg(s).) ☒ plus Annex of family members (1 pg(s).).
17. **International Preliminary Examination Report (IPER):**
- a. ☒ has been transmitted (if this letter is filed after 28 months from date in item 3) in English by the International Bureau with Annexes (if any) in original language.
- b. ☒ copy herewith in English.
- c.1 ☒ IPER Annex(es) in original language ("Annexes" are amendments made to claims/spec/drawings during Examination) including attached amended:
- c.2 ☒ Specification/claim pages # 2 pages 1 & 2 claims # 1 - 9
Dwg Sheets #
- d. ☒ Translation of Annex(es) to IPER (required by 30th month due date, or else annexed amendments will be considered canceled).
18. **Information Disclosure Statement** including:
- a. ☒ Attached Form PTO-1449 listing documents
- b. ☒ Attached copies of documents listed on Form PTO-1449
- c. ☒ A concise explanation of relevance of ISR references is given in the ISR.
19. ☐ **Assignment** document and Cover Sheet for recording are attached. Please mail the recorded assignment document back to the person whose signature, name and address appear at the end of this letter.
20. ☐ Copy of Power to IA agent.
21. ☐ **Drawings** (complete only if 8d or 10a(4) not completed): ___ sheet(s) per set: ☐ 1 set informal;
☐ Formal of size ☐ A4 ☐ 11"
22. Small Entity Status ☒ is **Not** claimed ☐ is claimed (pre-filing confirmation required)
- 22(a) ___ (No.) Small Entity Statement(s) enclosed (since 9/8/00 Small Entity Statements(s) not essential to make claim)
23. **Priority** is hereby claimed under 35 U.S.C. 119/365 based on the priority claim and the certified copy, both filed in the International Application during the international stage based on the filing in (country) MEXICO of:
- | | Application No. | Filing Date | | Application No. | Filing Date |
|-----|-----------------|--------------|-----|-----------------|-------------|
| (1) | 9810320 | Dec. 7, 1998 | (2) | | |
| (3) | | | (4) | | |
| (5) | | | (6) | | |
- a. ☒ See Form PCT/IB/304 sent to US/DO with copy of priority documents. If copy has not been received, please proceed promptly to obtain same from the IB.
- b. ☐ Copy of Form PCT/IB/304 attached.

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24. Attached:

25 Per Item 17.c2, cancel original pages #____, claims #____, Drawing Sheets #**26. Calculation of the U.S. National Fee (35 U.S.C. 371 (c)(1)) and other fees is as follows:**Based on amended claim(s) per above item(s) ☐ 12, ☐ 14, ☐ 17, ☐ 25 (hilitite)

Total Effective Claims	minus 20 =	x \$18/\$9 =	\$0	966/967
Independent Claims	minus 3 =	x \$80/\$40 =	\$0	964/965
If any proper (ignore improper) Multiple Dependent claim is present,		add \$270/\$135	+0	968/969

BASIC NATIONAL FEE (37 CFR 1.492(a)(1)-(4)): →→ **BASIC FEE REQUIRED, NOW** →→→→A. If country code letters in item 1 are not "US", "BR", "BB", "TT", "MX", "IL", "NZ", "IN" or "ZA"

See item 16 re:

1. Search Report was <u>not prepared by EPO or JPO</u> -----	add \$1000/\$500	960/961
2. Search Report was prepared by EPO or JPO -----	add \$860/\$430	+860 970/971

SKIP B, C, D AND E UNLESS country code letters in item 1 are "US", "BR", "BB", "TT", "MX", "IL", "NZ", "IN" or "ZA"

(X) → <input type="checkbox"/> B. If <u>USPTO</u> did not issue <u>both</u> International Search Report (ISR) <u>and</u> (if box 4(b) above is X'd) the International Examination Report (IPER), -----	add \$1000/\$500	+0	960/961
(only) → <input type="checkbox"/> C. If <u>USPTO</u> issued ISR but not IPER (or box 4(a) above is X'd), -----	add \$710/\$355	+0	958/959
(one) → <input type="checkbox"/> D. If <u>USPTO</u> issued IPER but IPER Sec. V boxes <u>not all</u> 3 YES, -----	add \$690/\$345	+0	956/957
(of) → <input type="checkbox"/> E. If international preliminary examination fee was paid to <u>USPTO and</u> Rules 492(a)(4) and 496(b) <u>satisfied</u> (IPER Sec. V <u>all</u> 3 boxes YES for <u>all</u> claims), -----	add \$100/\$50	+0	962/963

27. **SUBTOTAL = \$860**

28. If Assignment box 19 above is X'd, add Assignment Recording fee of ---\$40 +0 (581)

29. Attached is a check to cover the ----- **TOTAL FEES \$860**

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CHARGE STATEMENT. The Commissioner is hereby authorized to charge any fee specifically authorized hereafter, or any missing or insufficient fee(s) filed, or asserted to be filed, or which should have been filed herewith or concerning any paper filed hereafter, and which may be required under Rules 16-18 and 492 (missing or insufficient fee only) now or hereafter relative to this application and the resulting Official document under Rule 20, or credit any overpayment, to our Account/Order Nos. shown above for which purpose a duplicate copy of this sheet is attached.

This CHARGE STATEMENT does not authorize charge of the issue fee until/unless an issue fee transmittal form is filed

Pillsbury Winthrop LLP
Intellectual Property GroupBy Atty: Kevin E. JoyceReg. No. 20508

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NOTE: File in duplicate with 2 postcard receipts (PAT-103) & attachments.

09/857570

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re PATENT APPLICATION OF

Inventor(s): VIDRIO, Cesar A. G. et al

Filed: Herewith

Title: RECOVERY OF HYDROCARBONS IN OIL WELLS BY INJECTION OF TREATED
INERT GASES OBTAINED FROM THE INDUSTRIAL EFFLUENCE

June 7, 2001

PRELIMINARY AMENDMENTHon. Commissioner of Patents
Washington, D.C. 20231

Sir:

Please amend this application as follows:

IN THE SPECIFICATION:

At the top of the first page, just under the title, insert

☒ --This application is the National Phase of International Application
PCT/IB99/01843 filed November 19, 1999 which designated the U.S.
and that International Application☒ was ☐ was not published under PCT Article 21(2) in English.--

Respectfully submitted,

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APPLICATION UNDER UNITED STATES PATENT LAWS

Atty. Dkt. No. PW 281354/37939/GA
(M#)

Invention: RECOVERY OF HYDROCARBONS IN OIL WELLS BY INJECTION OF TREATED INERT GASES OBTAINED FROM THE INDUSTRIAL EFFLUENCE

Inventor (s): VIDRIO, Cesar Anatolio Garcia
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This is a:

- ☐ Provisional Application
- ☐ Regular Utility Application
- ☐ Continuing Application
☒ The contents of the parent are incorporated by reference
- ☒ PCT National Phase Application
- ☐ Design Application
- ☐ Reissue Application
- ☐ Plant Application
- ☐ Substitute Specification
Sub. Spec Filed _____
in App. No. _____ / _____
- ☐ Marked up Specification re
Sub. Spec. filed _____
In App. No. _____ / _____

SPECIFICATION

5 Field of the invention

The present invention relates to improvements in the process of recovering hydrocarbons in oil wells by injection of treated inert gases obtained from industrial effluence. Particularly it refers to a process of recovering hydrocarbons in oil wells by injection of treated inert gases obtained from the process of cement clinker production.

Preceding of the invention

Fossil fuels have successfully been burned in furnaces for a long time. Nevertheless, the possible reduction or minimization of air contamination is more and more being emphasized recently. In this aspect it is known that there is environmental contamination due to toxic substances. Environmental contamination also arises from substances or materials that contribute to the global warming, such as CO₂ for example.

Oil well production is classified in free-flowing and artificial production. With the first, hydrocarbons gush to the outside by natural energy, which can be hydraulic pressure or the inherent gas pressure of the deposit. Artificial oil well production or oil well production by pumping is an exploitation system applied, if the inherent pressure of the deposit is not sufficient for the oil to flow up to the surface.

In the past, oil wells, which were not flowing by inherent energy, were abandoned, thus generally recovering 20% of the total reserves. With the perfection of the exploitation methods, however, the recovering of hydrocarbons found in

these oil deposits was increased. Actually, if an oil well stops flowing, artificial exploiting methods are applied such as pneumatic, mechanical or hydraulic pumping.

5 Additionally, there exist systems, which improve the recovery by the injection of natural gas, nitrogen, carbon dioxide or water into the deposit. These systems proved to considerably increase the recovery of hydrocarbons at the deposits, making said recovering process more efficient, additionally
10 increasing the production capacity of the deposits and allowing a reasonable exploitation of the oil resources. On the other hand, the costs for production and preparation of said gases are rather considerable.

15 Prior Art and cross reference to related applications

Hydrocarbon recovery by injection of inert gases is already known for exhausted oil wells. The following patents show endeavors for its realization and as a reference their
20 specifications are incorporated.

U.S.patent 3,873,238 with the tittle "Method and apparatus for flowing crude oil from a well" of Johnnie A. Elfarr, granted on March 25th, 1975 relates to a method and apparatus for
25 flowing crude oil from wells wherein a fluid is injected into the oil bearing earth formation for the purpose of reducing the viscosity of the oil and causing it to migrate under induced formation pressure to one or more production wells.

30 U.S.patent 3,892,270 with the title "Production of hydrocarbons from underground formations" of Robert H. Lindquist, granted on July 1st, 1976 relates to a method for recovering hydrocarbons by injecting a mixture of oxidizing gas and steam into a lateral conduit of a hydrocarbon-
35 containing formation to produce a product gas and, based on values contained in such gas, controlling the reactions between mixtures of oxidizing gas and steam and hydrocarbons

in the formation to optimize the Kilocalories value (BTU) of the product gas.

In U.S.patent 4,267,885 with the title "Method and apparatus for optimizing production in a continuous or intermittent gas-lift well" of Dorsey W. Sanderford, granted on May 1st, 1981 the temperature of the fluid is sensed at the wellhead and used to determine the injection parameter values to optimize well production. In one embodiment, a process control unit is programmed according to the inventive method to interpret the temperature data and to control the gas control valve in order to optimize production.

U.S.patent 4,025,235 with the title "System for improving oil well production" of Joseph S. Newbrough, granted on May 24th, 1977 relates to a system utilizing intermittent build-up and release of gas pressure in the annulus between the casing and tubing in an oil well with an inert gas interface between the gas and the producing fluid.

U.S.patent 4,480,697 with the title "Method and apparatus for converting an oil well to a well with effluent raising by gas lift" of Rene F. Goldaniga, Geard Walter, G. W. Walter, Bernard J. P. Glotin and Daniel Gallois, granted on November 6th, 1984 relates to a method of and apparatus for converting an oil well with natural effluent rise to one with gas-lift of the effluent column, wherein the oil well has a nipple in the production tube provided with a stop-groove and smooth bearing surfaces between which a hydraulic control line comes out.

U.S.patent 4,649,994 with the title "Installation for bringing hydrocarbon deposits into production with reinjection of effluents into the deposit or into the well or wells" of Gerard Chaudot, granted on March 17th, 1987 relates to an installation for bringing into production hydrocarbon deposits with reinjection of effluents into the deposit or into the well or wells and a process for using this installation. Said

installation comprises at least one sealed casing, the base of which communicates with the deposit; at least one sealing plug disposed in the lower part of the casing and forming a capacity; at least one duct for either injecting or removing a pressurized gas; a condensate injection pipe passing through the capacity and opening into the base of the casing beyond said plug, this pipe communicating with the inner volume of the casing downstream of the plug, as well as with said capacity through a valve system.

U.S.patent 5,105,889 with the title "Method of production of formation fluid and device for effecting thereof" of Taimuraz K. Misikov, Vladimir M. Shaposhnikov and Alexandr P.Skripkin granted on April 21th, 1992 relates to a method of production of the formation fluid, which is used in wells with a low formation pressure. The method consists in that the gas is dissolved in the well from a flow of the formation fluid forcedly liberated, whereupon the formation fluid is transformed into a finely dispersed gas-liquid flow in which the amount of liberated gas ensures self-lift of the formation fluid to the wellhead.

WO98/0233A2 with the title "Fluid separation and reinjection systems for oil wells" of Christopher K.Shaw published on November 7th, 1997 relates to a fluid separation and reinjection system for use in a wellbore extending through a production zone producing an oil/water mixture and a water reinjection zone, which comprises a tubing disposed within the wellbore in fluid communication with the production zone defining an oil flow channel and in fluid communication with the water reinjection zone defining a water reinjection channel.

Neither the references cited above nor the literature to the best knowledge of the inventors reveal the possibility of utilizing industrial effluence and in particular inert gases

from the burning of clinker for the recovery of hydrocarbons from exhausted oil wells.

Summary of the invention

5

An object of the present invention is to recover hydrocarbons from exhausted oil wells by treated inert gases, which arise from the effluence (escape or chimney gases) of industrial waste. The inert gases are mostly composed of nitrogen and carbon dioxide.

10

Another object of the present invention is to utilize the emission gases of the combustion and calcination in production processes, in particular in the processes of the cement clinker production.

15

Another object of the present invention is to utilize emission gases of the combustion of materials such as fossil fuel (oil, gas and coal) or alternative fuels such as waste tires and waste wood, etc.

20

Another object of the invention is the reduction of the contamination level of cement clinker production processes.

The invention has as additional object the treatment of combustion gases in order to utilize them in other processes in which certain of their components are used.

25

Another object of the invention is to reduce contamination of cement clinker production.

30

Description

The present invention relates to improvements in the process of recovering hydrocarbons in oil wells. The recovering of hydrocarbons is realized by the injection of treated inert

35

gases of one or various industrial effluences. Actually, the improvements of the process consist in

- treating the industrial effluence by operations appropriate to make constituents and parameters such as for example temperature, concentration, pressure and/or expenditure of the industrial effluence compatible with the hydrocarbons of the deposit and
- regulating the distribution of different types of gases from their place of origin.

In one embodiment of the invention the industrial effluences were selected from combustion and/or calcination gases from production processes.

Some examples for the operations used for the invention are adsorption, separation of dust, condensation, liquefaction and distillation, compression and distribution. These operations, which are known in detail to those who are skilled in the art, are not described in the present specification for reasons of simplicity.

The inert gases according to the invention comprise a mixture of N_2 and CO_2 with a percentage of 75 to 85 and 15 to 25%, such that the sum results in 100%.

It has been found that in order to make the constituents compatible it is particularly advantageous to augment the concentration of N_2 in the injection gases taking a part of the air coming from the chimney.

By the present invention it is possible to recycle water and oxygen.

Surprisingly it was found that by the present invention the contamination of the cement clinker production was reduced.

Short description of the drawings

A number of objects of the invention have been mentioned above. Other objects and advantages of the invention will appear according to the progress of the invention by taking into account the following drawings, in which an example of the best way of the invention is illustrated. Taking into account the figures of the drawings

10 Fig.1 is a schematic diagram of the process according to the present invention, which includes both the cement process and the process of the oil deposit and

15 Fig.2 is a schematic diagram of the conditioning of the combustion gases in the cement process for the injection into the oil deposit.

Detailed description of the drawings

20 With reference to the figures a first embodiment is shown in Fig.1 and Fig.2. The invention follows the part of the cement process, where as raw materials limestone and clay are fed (10) to a step of crushing and prehomogenization (20) whereupon follows a step of grinding the raw material (30).
25 The ground raw material is supplied to a kiln system (40), wherefrom it is proceeded on the one hand to cement grinding (50) and thereupon to storage and distribution of the cement (60). On the other hand low-pressure CO₂ and N₂ (110) as effluence pass through a compressor (115) in order to produce
30 high-pressure CO₂ and N₂ (120) for supplying them to the oil deposit, in which the gas phases (130), oil (140) and water (150) are found.

35 As is illustrated in Fig.2 the conditioning of the gases in the cement process comprises in a particular embodiment a step of existing dedusting, a step of additional dust removal, a step of condensation, wherefrom H₂O, HCl, SO₂ are recycled, a

step of liquefaction and distillation with CO₂ and O₂, which can be recycled and a final step of compression and distribution of N₂ and CO₂. This structure or configuration is preferred for the present application but may not be necessary for other applications.

Description of an example including the best mode of the invention

10 The demand for inert gases for recovering hydrocarbons in the oil deposits in the region of the south of Mexico is approximately 16 million m³/day (564 million cubic feet/day). This volume being required a net of distribution ducts is envisaged from various potential sources in order to inject
15 gases into the oil deposits considering the gas-producing sources near the oil deposits having supplying potential. The potential sources are shown in table 1.

20 Table 1: Potential sources of gas injection into oil deposit in the Southeast region.

Sources	Inert gas	Ntcfd	Ncmd	%
Apasco, Mucaspansa	CO ₂ , N ₂	148 344	4 200 000	26
Campo Carmito	CO ₂	80 000	2 264 000	14
Petroquimicas	CO ₂	100 000	2 830 000	18
Apasco, Orizaba	CO ₂ N ₂	235 656	6 669 065	42
Total potential		564 000	15 961 200	100

Ntcfd: Normalized (0°C, 1 atm) thousand cubic feet per day;

25 Ncmd: Normalized (0°C, 1 atm) cubic meter per day

The table shown above indicates the total distribution of the injection gases required for all oil deposits in the Southeast

It should be evident, that the requirements of the inert gases will vary from one oil deposit to another, the parameters like pressure and temperature of the gas supply will have to be considered and that the distribution of the producing sources of different types of gases will be a function of the compatibility of these gases with the hydrocarbons of the deposit.

A number of details of the invention can be changed without going beyond the scope of the invention. Additionally, the above description of the preferred embodiment of the invention and the best way for carrying out the invention is proposed merely for the intention of illustration and not for the intention of limitation. The invention is defined only by its claims.

Druckexemplar

7. DEZ. 2000 16:36

AUPAT-DR. HÄFFNER +43 1 5339250

NR. 894 S. 5

- 1 -

Claims:

1. A process for recovering hydrocarbons in oil wells by injection of treated inert gases characterized in that industrial effluences are subjected to one or more of adsorption, separation of dusts, condensation, liquefaction, distillation and compression and that temperature, concentration, pressure and/or expenditure of the industrial effluences are adjusted in order to obtain treated inert gases compatible with the hydrocarbons of the deposit.

2. A process according to claim 1, characterized in that combustion and/or calcination gases from production processes are selected as industrial effluence.

3. A process according to claim 1 or 2, characterized in that the treated inert gases comprise a mixture of CO_2 and N_2 .

4. A process according to claim 1, 2 or 3, characterized in that water and oxygen are recycled.

5. A process according to claim 3 or 4, characterized in that a percentage of N_2 and CO_2 of 75 to 85 and 15 to 25%, respectively, is obtained, such that the sum of both results in 100%.

6. A process according to any one of claims 1 to 5, characterized in that part of the air coming from the chimney is taken in order to augment the concentration of N_2 of the injection gases.

7. A process according to any one of claims 1 to 6, characterized in that the emission gases of the combustion of materials selected from the group consisting of fossil fuel (oil, gas and coal) or alternative fuels as waste tires and waste wood, etc. and combinations thereof are used.

7.DEZ.2000 16:36 AUPAT-DR.HAFFNER +43 1 5339250

NR.894 S.6

- 2 -

8. A proces for reducing the contamination in the cement clinker production, characterized in that the effluences coming from combustion and/or calcining gases are subjected to one or more of adsorption, separation of dusts, condensation, liquefaction, distillation and compression and that temperature, concentration, pressure and/or expenditure of the effluences are adjusted in order to obtain treated inert gases compatible for utilizing them for recovering hydrocarbons in oil wells

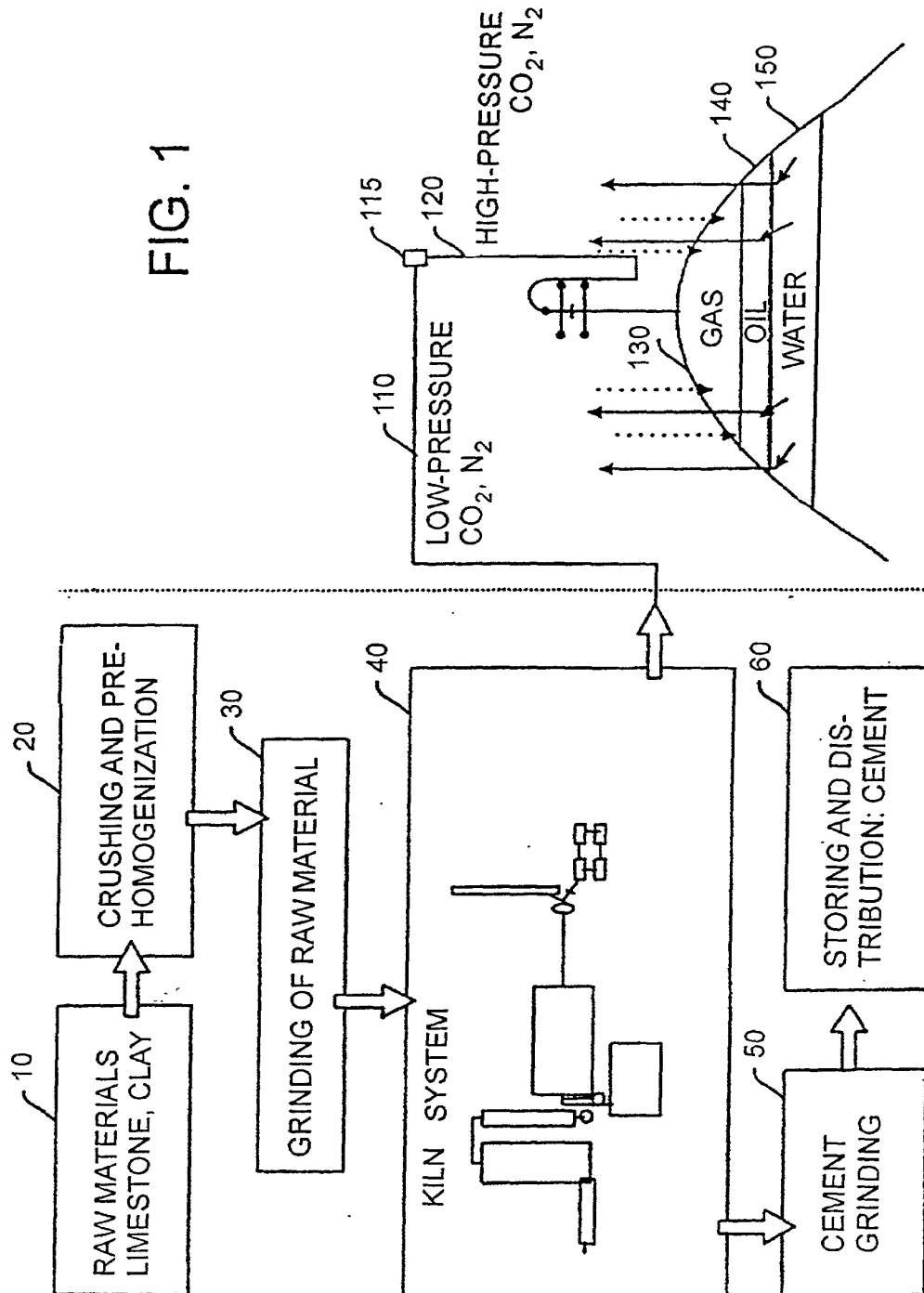
- 10 9. Use of industrial effluences for recovering hydrocarbons in oil wells characterized in that the industrial effluences are subjected to one or more of adsorption, separation of dusts, condensation, liquefaction, distillation and compression and that temperature, concentration, pressure and/or expenditure of the industrial effluences are adjusted in order to obtain treated inert gases compatible with the hydrocarbons of the deposit and that the treated inert gases are injected into the oil well.



Abstract:

The invention describes improvements in the process of recovering hydrocarbons in oil wells by injection of treated
5 inert gases of one or various industrial effluences comprising
the steps of treating the industrial effluence(s) by
operations appropriate to make the constituents and the
parameters of the effluence compatible with the hydrocarbons
of the deposit and regulating the distribution of different
10 types of gases from their place of origin.

FIG. 1



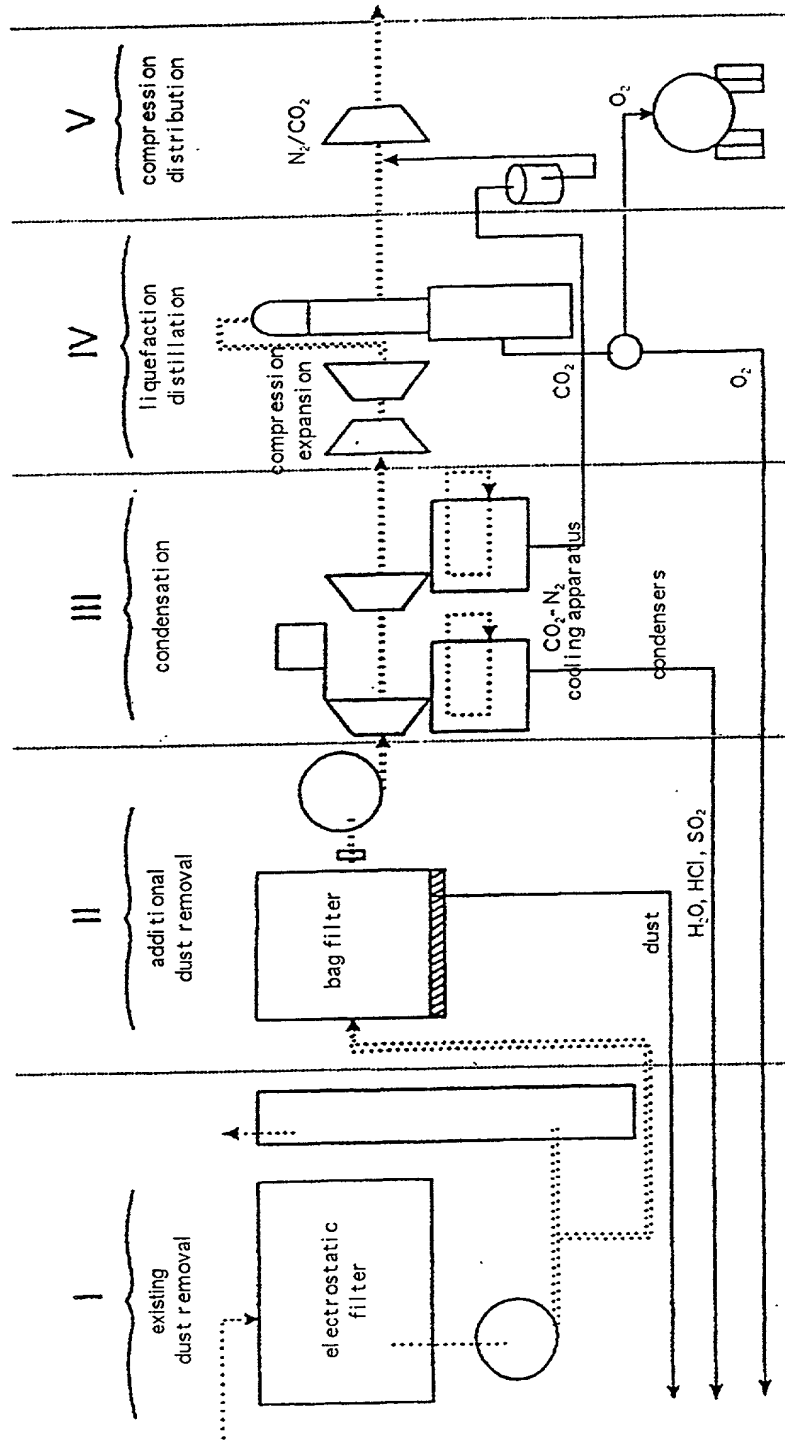


FIG. 2

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Approved for use through 10/31/2002. OMB 0651-0036

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#3

**CHANGE OF
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Application**Address to:
Assistant Commissioner for Patents
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Application Number	09/857570
Filing Date	June 7, 2001
First Named Inventor	VIDRIO et al
Group Art Unit	Unknown
Examiner Name	Unknown
Attorney Docket Number	281354

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Patentee.

Assignee of record of the entire interest. See 37 CFR 3.71.
Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96).

Attorney or agent of record.

Typed or
Printed Name Kevin E. Joyce

Signature

Date

September 15, 2001

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*.

☒ *Total of 1 forms are submitted.

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Kevin E. Joyce

FOR UTILITY/DESIGN
CIP/PCT NATIONAL/PLANT
ORIGINAL/SUBSTITUTE/SUPPLEMENTAL
DECLARATIONS

RULE 63 (37 C.F.R. 1.63)
DECLARATION AND POWER OF ATTORNEY
FOR PATENT APPLICATION
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

PM & S
FORM

As a below named inventor, I hereby declare that my residence, post office address and citizenship are as stated below next to my name, and I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the **INVENTION ENTITLED RECOVERY OF HYDROCARBONS IN OIL WELLS BY INJECTION OF TREATED INERT GASES OBTAINED FROM THE INDUSTRIAL EFFLUENCE**

the specification of which (CHECK applicable BOX(ES))

X A. ☐ is attached hereto.

BOX(ES) → B. ☒ was filed on June 7, 2001 as U.S. Application No. 09 /857570

→ C. ☒ was filed as PCT International Application No. PCT/ IB99 / 01843 on November 19, 1999

and (if applicable to U.S. or PCT application) was amended on

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above. I acknowledge the duty to disclose all information known to me to be material to patentability as defined in 37 C.F.R. 1.56. I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT International Application which designated at least one other country than the United States, listed below and have also identified below any foreign application for patent or inventor's certificate, or PCT International Application, filed by me or my assignee disclosing the subject matter claimed in this application and having a filing date (1) before that of the application on which priority is claimed, or (2) if no priority claimed, before the filing date of this application:

PRIOR FOREIGN APPLICATION(S)

Number	Country	Day/MONTH/Year Filed	Date first Laid- open or Published	Date Patented or Granted	Priority Claimed Yes No
9810320	Mexico	07 December 1998			X

I hereby claim domestic priority benefit under 35 U.S.C. 119(e) or 120 and 365(c) of the indicated United States applications listed below and PCT international applications listed above or below and, if this is a continuation-in-part (CIP) application, insofar as the subject matter disclosed and claimed in this application is in addition to that disclosed in such prior applications, I acknowledge the duty to disclose all information known to me to be material to patentability as defined in 37 C.F.R. 1.56 which became available between the filing date of each such prior application and the national or PCT international filing date of this application:

PRIOR U.S. PROVISIONAL, NONPROVISIONAL AND/OR PCT APPLICATION(S)

Application No. (series code/serial no.)	Day/MONTH/Year Filed	Status pending, abandoned, patented	Priority Claimed Yes No
PCT/IB99/01843	19 November 1999	pending	X

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

And I hereby appoint Pillsbury Madison & Sutro LLP, Intellectual Property Group, 1100 New York Avenue, N.W., Ninth Floor, East Tower, Washington, D.C. 20005-3918, telephone number (202) 861-3000 (to whom all communications are to be directed), and the below-named persons (of the same address) individually and collectively my attorneys to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith and with the resulting patent, and I hereby authorize them to delete names/numbers below of persons no longer with their firm and to act and rely on instructions from and communicate directly with the person/assignee/attorney/firm/ organization who/which first sends/sent this case to them and by whom/which I hereby declare that I have consented after full disclosure to be represented unless/until I instruct the above Firm and/or a below attorney in writing to the contrary.

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(FOR ADDITIONAL INVENTORS, check box ☒ to attach PAT 116-2 same information for each re signature, name, date, citizenship, residence and address.)

DECLARATION AND POWER OF ATTORNEY

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